

# Work Order ID 91178

**\*91178\***

Page 1

October-03-12 11:48:19 AM

Item ID: D350-748-241TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 03/10/2012 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 18/10/2012 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: MLJ Date: 12-10-03 Tooling:

Run Start **\*NR1\***

QC: Date: SPC (Y/N): Date:

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

| Draw Nbr | Revision Nbr |
|----------|--------------|
|----------|--------------|

D350-748-241

F

100

0.00

**\*100\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA647  
2-Turn first side as per Folio FA647  
3- File transition lines smooth.  
FOLIO REV: N/A  
DWG REV: F

110

QC1- Inspect dimensions to dimension sheet

0.00

**\*110\***

QC  
Quality Control

Memo

0.00

*Handwritten:* KC/gmm.L  
12/10/22

*Handwritten:* KC/gmm.L  
12/10/22

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|------------------------------------|--|--------------------------------------|---|--------------------------|---|------------------------|---------------------|---------------------|--|--|------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |                                    |  |                                      | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                          | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%; border: none;"> <tr> <td style="width: 25%;">Skid-tube <input type="checkbox"/></td> <td style="width: 25%;">Crosstube <input type="checkbox"/></td> <td style="width: 25%;">Water Jet <input type="checkbox"/></td> <td style="width: 25%;">Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> |                        |                     |                     |  |  | Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/>           | Engineering <input type="checkbox"/> |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/>   | Quality <input type="checkbox"/>     |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/>       |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/>            |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| <b>Root Cause</b>  | <b>Date</b>                        | <b>Step</b>                                  | <b>Qty</b>                           | <b>Description of work order update or Non-conformance</b>  | <b>Initial Chief Eng</b> | <b>Action Description</b>   | <b>Sign &amp; Date</b> | <b>Verification</b> | <b>QC Inspector</b> |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Doc/Data <input type="checkbox"/>                            |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Equip/Tooling <input type="checkbox"/>                       |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Operator <input type="checkbox"/>                            |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Material <input type="checkbox"/>                            |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Setup <input type="checkbox"/>                               |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Other <input type="checkbox"/>                               |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Process <input type="checkbox"/>                             |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Supplier <input type="checkbox"/>                            |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Training <input type="checkbox"/>                            |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Unapproved <input type="checkbox"/>                          |                                    |  |                                      |   |                          |   |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| FAULT CATEGORY  |   |   |   |
|---|---|---|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge<br><br><input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><input type="checkbox"/> Other |

**Work Order ID 91178**

October-03-12 11:48:19 AM

**\*91178\***

Page 2

Item ID: D350-748-241TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 03/10/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 18/10/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

120

0.00

**\*120\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA647  
2- File transition lines smooth.  
3-Scribe part # as per Dwg D350-748-241  
FOLIO REV: N/A  
DWG REV: E1 / ~~0~~ KC 12-10-23

130

QC1- Inspect dimensions to dimension sheet

0.00

**\*130\***

QC

Memo

0.00

Quality Control

1 / ~~0~~ KC 12-10-23

140

QC8- Inspect parts - second check

0.00

**\*140\***

QC

Memo

0.00

Quality Control

JW 12-10-24

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|------------------------------------|--|--------------------------------------|---|--------------------------|--|------------------------|---------------------|---------------------|--|--|------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |                                    |  |                                      | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                          | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width:100%; border: none;"> <tr> <td style="width: 25%;">Skid-tube <input type="checkbox"/></td> <td style="width: 25%;">Crosstube <input type="checkbox"/></td> <td style="width: 25%;">Water Jet <input type="checkbox"/></td> <td style="width: 25%;">Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> |                        |                     |                     |  |  | Skid-tube <input type="checkbox"/> | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/>           | Engineering <input type="checkbox"/> |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/>   | Quality <input type="checkbox"/>     |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/>       |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/>            |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| <b>Root Cause</b>  | <b>Date</b>                        | <b>Step</b>                                  | <b>Qty</b>                           | <b>Description of work order update or Non-conformance</b>  | <b>Initial Chief Eng</b> | <b>Action Description</b>  | <b>Sign &amp; Date</b> | <b>Verification</b> | <b>QC Inspector</b> |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Doc/Data <input type="checkbox"/>                            |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Equip/Tooling <input type="checkbox"/>                       |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Operator <input type="checkbox"/>                            |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Material <input type="checkbox"/>                            |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Setup <input type="checkbox"/>                               |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Other <input type="checkbox"/>                               |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Process <input type="checkbox"/>                             |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Supplier <input type="checkbox"/>                            |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Training <input type="checkbox"/>                            |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Unapproved <input type="checkbox"/>                          |                                    |  |                                      |   |                          |  |                        |                     |                     |  |  |                                    |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| FAULT CATEGORY  |   |   |   |
|---|---|---|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge<br><br><input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |

**Work Order ID 91178**

October-03-12 11:48:19 AM

**\*91178\***

Page 3

Item ID: D350-748-241TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 03/10/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 18/10/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

150

0.00

**\*150\***

Large Fab

Crosstubes

Memo

0.00

Crosstubes

1-DRILL HOLES FOR HEAT TREAT USING DT9806(HOLES MUST BE  
ALIGNED ON SAME LINE ON BOTH CUFFS)

2-Grind machining marks

> RM 12-11-15  
> RM 12-11-12

160

Outsource process - Heat Treat

0.00

**\*160\***

Outsource1

Memo

0.00

Outsource process - Heat Treat

Issue P/O: 18919

Heat Treat to min 180 KSI As per Dwg D350-748-241

Sand Blast tube after Heat Treat

Possible Supplier: Vac Aero

Ensure Certificate of Conformity is attached

RM 12-11-15

170

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00

**\*170\***

Packaging

Memo

0.00

Packaging

Ensure certificate of conformaty is attached

RM 12-11-15

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|---|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>  | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>  | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>  | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause                             | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|--|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling <input type="checkbox"/> |      |      |     |   |                   |                    |             |              |              |
| Operator <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Material <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Setup <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Other <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Process <input type="checkbox"/>       |      |      |     |   |                   |                    |             |              |              |
| Supplier <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Training <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Unapproved <input type="checkbox"/>    |      |      |     |   |                   |                    |             |              |              |

### FAULT CATEGORY

|   |   |   |  |   |
|---|---|---|--|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge | <input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><input type="checkbox"/> Other |
|---|---|---|--|---|

**Work Order ID 91178**

October-03-12 11:48:19 AM

**\*91178\***

Page 4

Item ID: D350-748-241TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 03/10/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 18/10/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start **\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop **\*NR2\***Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

180

QC6- Inspect dimensions to drawing

0.00

**\*180\***

QC

Memo

0.00

Quality Control

DAS  
16  
13/01/03

190

Packaging

0.00

**\*190\***

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack  
Location: LL

MO 13/01/07

200

QC21- Final Inspection - Work Order Release

0.00

**\*200\***

QC

Memo

0.00

Quality Control

MCS 13-a-08

13-01-07

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |             |             |            |   |                          |   |                        |                     |                     |  |  |
|--|-------------|-------------|------------|---|--------------------------|---|------------------------|---------------------|---------------------|--|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |             |             |            | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                          | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Crosstube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div> |                        |                     |                     |  |  |
| <b>Root Cause</b>  | <b>Date</b> | <b>Step</b> | <b>Qty</b> | <b>Description of work order update or Non-conformance</b>  | <b>Initial Chief Eng</b> | <b>Action Description</b>   | <b>Sign &amp; Date</b> | <b>Verification</b> | <b>QC Inspector</b> |  |  |
| Doc/Data   |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Equip/Tooling  |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Operator   |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Material   |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Setup  |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Other  |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Process  |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Supplier   |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Training   |             |             |            |   |                          |   |                        |                     |                     |  |  |
| Unapproved   |             |             |            |   |                          |   |                        |                     |                     |  |  |

| FAULT CATEGORY  |   |   |   |  |
|---|---|---|---|--|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge<br><br><input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |  |



# Picklist Print

October-03-12 11:48:22 AM

Page 1

Work Order ID: 91178

\*91178\*

Parent Item: D350-748-241TRN

\*D350-748-241TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 03/10/2012

Required Date: 18/10/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
IPP Rev B Removed polish 08.04.02 EC verified by : DD  
IPP Rev C Removed LPS-3 08.06.23 Ec verified by: DD IPP Rev D  
11.02.24 as per dwg rev.F DD verf: JLM

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6015-125                       |                        | Manufactured  | No          |                     |                  | 120             | Each               | 78.0000        | 1           | 1            |               |                |        |

\*D6015-125\*

\*\*

Crosstube Material

## Location

## Loc Qty

## Loc Code

HALL

78

61380

4

72511

4

81022

70

mmL 12/10/22

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |  |  |  | <b>DISPOSITION</b><br><br><div style="display: flex; justify-content: space-around;"> <div> <input type="checkbox"/> Rework<br/> <input type="checkbox"/> Scrap<br/> <input type="checkbox"/> Use-as-is<br/> <input type="checkbox"/> Work Order Update         </div> <div> <input type="checkbox"/> Skid-tube<br/> <input type="checkbox"/> Machining<br/> <input type="checkbox"/> Thermoforming<br/> <input type="checkbox"/> Large Fab         </div> <div> <input type="checkbox"/> Crosstube<br/> <input type="checkbox"/> Small Fab<br/> <input type="checkbox"/> Finishing<br/> <input type="checkbox"/> Composite         </div> <div> <input type="checkbox"/> Water Jet<br/> <input type="checkbox"/> Prod. Eng. Coord.<br/> <input type="checkbox"/> Rec/Store/Packaging<br/> <input type="checkbox"/> Supplier         </div> <div> <input type="checkbox"/> Engineering<br/> <input type="checkbox"/> Quality<br/> <input type="checkbox"/> Other         </div> </div> |  |
|--|--|--|--|--|--|

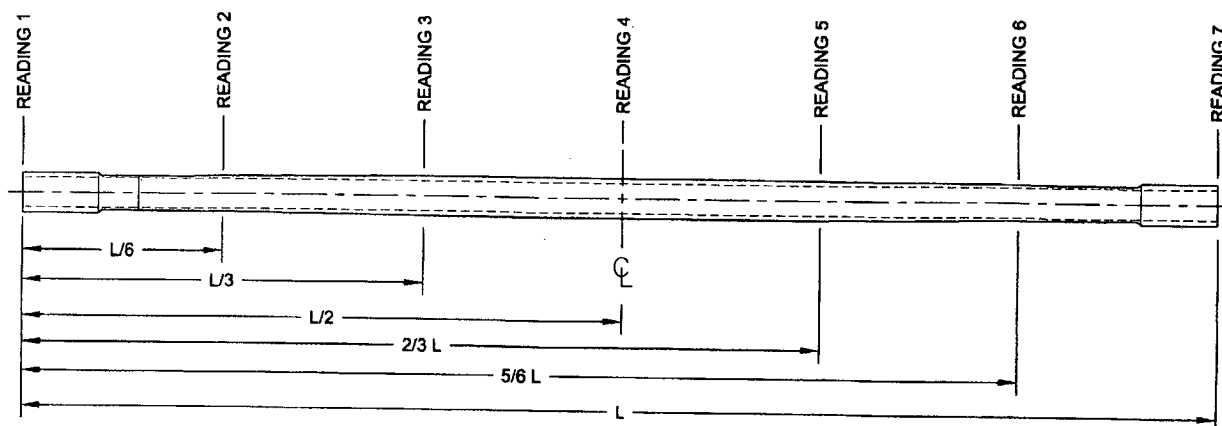
|   |  |                     |              |
|---|--|---------------------|--------------|
| <b>DART AEROSPACE LTD</b>                                   |  | <b>Work Order:</b>  | 91178        |
| <b>Description:</b> Crosstube Assembly (AS350/355 High Aft) |  | <b>Part Number:</b> | D350-748-241 |
| <b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> F           |  | <b>Page 1 of 2</b>  |              |

### FIRST ARTICLE INSPECTION CHECKLIST

| Inspection Sheet<br>Drawing Dimension |        | Tolerance     | Actual<br>Dimension | Accept | Reject | Method of<br>Inspection | Comments |
|---------------------------------------|--------|---------------|---------------------|--------|--------|-------------------------|----------|
| SIDE A                                | 2.240  | +0.005/-0.000 | 2.244               | ✓      |        | VERN                    | CNC-08   |
|                                       | 2.180  | +0.005/-0.000 | 2.185               | ✓      |        |                         |          |
|                                       | 2.180  | +0.005/-0.000 | 2.185               | ✓      |        |                         |          |
|                                       | 2.208  | +0.005/-0.000 | 2.213               | ✓      |        |                         |          |
|                                       | 2.234  | +0.005/-0.000 | 2.238               | ✓      |        |                         |          |
|                                       | 2.253  | +0.005/-0.000 | 2.258               | ✓      |        |                         |          |
|                                       | 2.272  | +0.005/-0.000 | 2.277               | ✓      |        |                         |          |
|                                       | 2.299  | +0.005/-0.000 | 2.304               | ✓      |        |                         |          |
|                                       | 0.063  | +/-0.010      | 0.063               | ✓      |        | VERN                    | CNC-08   |
|                                       | 4.26   | +/-0.030      | 4.285               | ✓      |        | VERN                    | CNC-08   |
|                                       | R0.063 | +/-0.010      | 0.063               | ✓      |        | R6                      | —        |
|                                       | R0.50  | +/-0.030      | 0.50                | ✓      |        | R6                      | —        |
|                                       |        |               |                     |        |        |                         |          |
|                                       |        |               |                     |        |        |                         |          |
| SIDE B                                | 2.240  | +0.005/-0.000 | 2.244               | ✓      |        | VERN                    | CNC-08   |
|                                       | 2.180  | +0.005/-0.000 | 2.185               | ✓      |        |                         |          |
|                                       | 2.180  | +0.005/-0.000 | 2.184               | ✓      |        |                         |          |
|                                       | 2.208  | +0.005/-0.000 | 2.213               | ✓      |        |                         |          |
|                                       | 2.234  | +0.005/-0.000 | 2.238               | ✓      |        |                         |          |
|                                       | 2.253  | +0.005/-0.000 | 2.258               | ✓      |        |                         |          |
|                                       | 2.272  | +0.005/-0.000 | 2.277               | ✓      |        |                         |          |
|                                       | 2.299  | +0.005/-0.000 | 2.306               | ✓      |        |                         |          |
|                                       | 0.063  | +/-0.010      | 0.063               | ✓      |        | VERN                    | CNC-08   |
|                                       | 4.26   | +/-0.030      | 4.288               | ✓      |        | VERN                    | CNC-08   |
|                                       | R0.063 | +/-0.010      | 0.063               | ✓      |        | R6                      | —        |
|                                       | R0.50  | +/-0.030      | 0.50                | ✓      |        | R6                      | —        |
|                                       |        |               |                     |        |        |                         |          |
|                                       |        |               |                     |        |        |                         |          |
|                                       | 122.70 | +/-0.060      | 122.690             | ✓      |        | Tap                     | LC-22    |

|   |  |                     |              |
|---|--|---------------------|--------------|
| <b>DART AEROSPACE LTD</b>                                   |  | <b>Work Order:</b>  | 91178        |
| <b>Description:</b> Crosstube Assembly (AS350/355 High Aft) |  | <b>Part Number:</b> | D350-748-241 |
| <b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> F           |  | <b>Page 2 of 2</b>  |              |

### WALL THICKNESS MEASUREMENT



| Location               | WALL THICKNESS MEASUREMENT (IN) |      |      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|------------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
|                        | w1                              | w2   | w3   | w4   |                                      |           |
| READING 1<br>L= 0"     | .123                            | .130 | .128 | .120 | .010                                 | 0.030"    |
| READING 2<br>L= 20.45  | .117                            | .119 | .122 | .118 | .005                                 |           |
| READING 3<br>L= 40.90  | .159                            | .152 | .150 | .160 | .010                                 |           |
| READING 4<br>L= 61.35  | .158                            | .150 | .150 | .159 | .009                                 |           |
| READING 5<br>L= 81.80  | .158                            | .154 | .151 | .156 | .007                                 |           |
| READING 6<br>L= 102.25 | .124                            | .121 | .111 | .118 | .013                                 |           |
| READING 7<br>L= 122.70 | .124                            | .123 | .123 | .119 | .005                                 |           |

#### Calibration Result

Actual Block Thickness: 100-200

Sitiescan 250 Measured Thickness: 100-200

|   |  |  |
|---|--|--|
| <b>Measured by:</b> Kc<br><b>Date:</b> 12-10-23 | <b>Audited by:</b> JW<br><b>Date:</b> 12-10-24 | <b>Preliminary Approval:</b><br><b>Date:</b> |
|---|--|--|

| Rev | Date     | Change                       | Revised by | Approved |
|-----|----------|------------------------------|------------|----------|
| A   | 07.01.17 | New Issue (P/O D350-748-201) | KJ/JLM     |          |
| B   | 12.02.02 | Dwg Rev updated              | KJ         |          |
| C   | 12.06.04 | Wall thickness form added    | KJ         |          |

| Item | Qty<br>-241 | Part Number   | Description                            |
|------|-------------|---------------|--|
| 1    | X           | D350-748-241  | CROSSTUBE ASSEMBLY (AS 350/355 HI AFT) |
| 2    | 1           | D6015-125     | CROSSTUBE (OR D6018-125)               |
| 3    | 2           | D3502-1       | SUPPORT                                |
| 4    | 2           | D2856-400-710 | ABRASION STRIP                         |
| 5    | 1           | AELS-1032-225 | INSERT                                 |
| 6    | 1           | NAS1149D0363J | WASHER (OR AN960JD10)                  |
| 7    | 2           | MS21920-20    | CLAMP (PER DART SPEC. M-MS21920-20)    |
| 8    | 1           | MS27039-1-10  | SCREW                                  |

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING  
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER  
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO  
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO  
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,  
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,  
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.  
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE  
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO  
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT  
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN  
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 91178 MLS

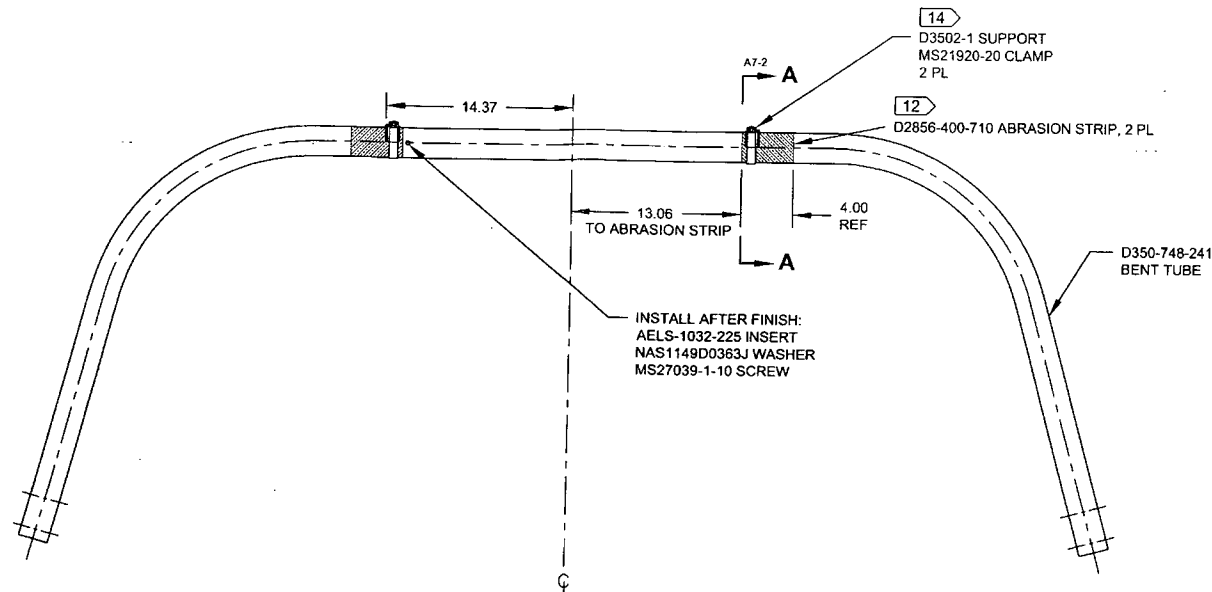
12-10-03 UNDER REVIEW

12/9/18

RELEASED  
2011-01-08

|            |   |   |          |
|------------|---|---|----------|
| F          | ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD<br>TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION<br>(C8-1), STOCK DIM NOW MACHINED (D1-4) | CP  | 10.11.23 |
| E          | REVISE GENERAL NOTES; UPDATE TO CURRENT<br>STANDARDS; RELOCATED FLAG #6 PER PAR 08-046<br>(ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)       | RF  | 09.09.30 |
| D          | MAG. PARTICLE AND CAD PLATE AS MFD.   | CP  | 06.10.31 |
| C          | ADD CAD PLATING   | CP  | 06.08.14 |
| B          | ADD D6018-125 & PRIME AND PAINT   | CP  | 06.06.30 |
| A          | NEW ISSUE   | CP  | 06.03.31 |
| REV.       | DESCRIPTION   | BY  | DATE     |
| DESIGN     | 9   | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA  |          |
| DRAWN      | 9   |   |          |
| CHECKED    | 9   |   |          |
| MFG. APPR. | 9   |   |          |
| APPROVED   | 9   |   |          |
| DE APPR.   | 9   | DRAWING NO. REV. F<br>D350-748-241 SHEET 1 OF 4<br>TITLE SCALE<br>CROSSTUBE (AS 350/355 HI AFT) NTS   |          |
| DATE       | 10.11.23  | <small>COPYRIGHT © 2006 BY DART AEROSPACE LTD<br/> THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS<br/> NOT TO BE USED FOR ANY PURPOSE OR COPIED OR REPRODUCED IN ANY FORM WITHOUT<br/> WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small> |          |

91178



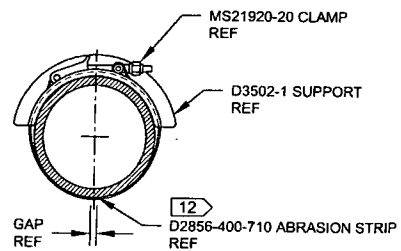
**D350-748-241  
ASSEMBLY DETAIL**

UNDER REVIEW

17/9/18

RELEASED

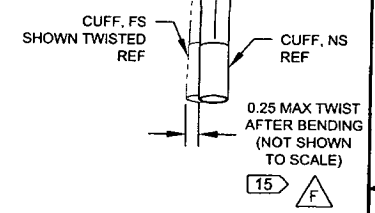
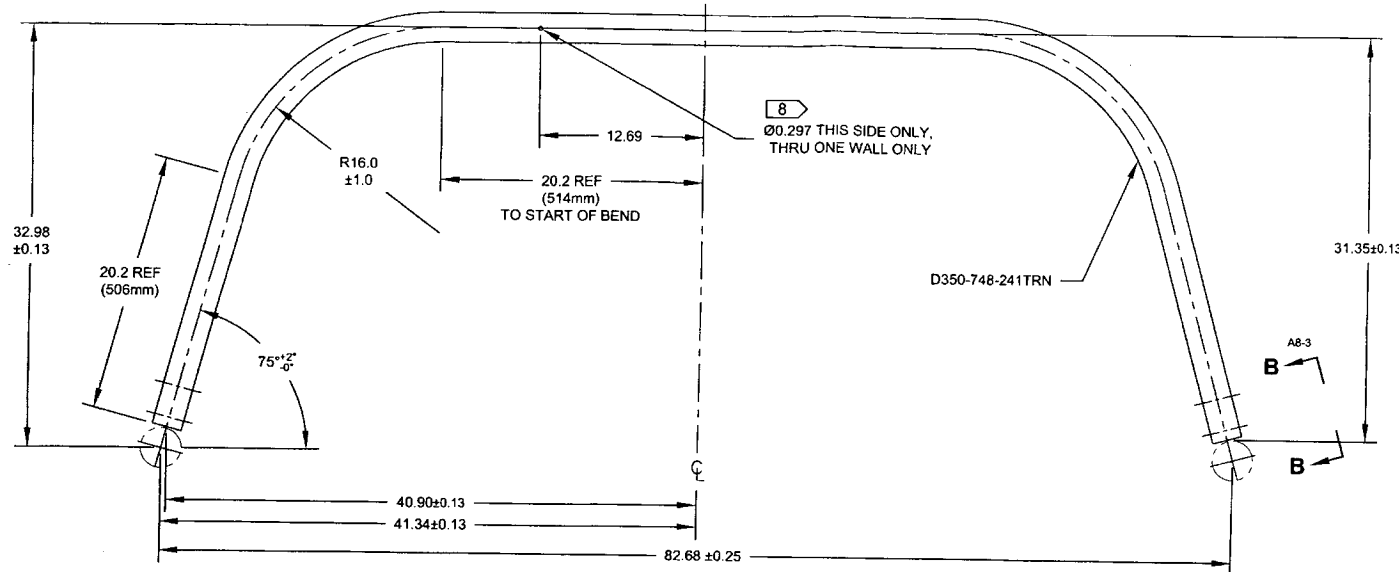
2011-02-18



**SECTION A-A D4-2  
SCALE 4X**

|            |          |  |              |
|------------|----------|--|--------------|
| DESIGN     | QP       | <b>DART AEROSPACE LTD</b>  |              |
| DRAWN      | QP       | HAWKESBURY, ONTARIO, CANADA  |              |
| CHECKED    | LS       | DRAWING NO.  | REV. F       |
| MFG. APPR. | LS       | D350-748-241   | SHEET 2 OF 4 |
| APPROVED   | LS       | TITLE  | SCALE        |
| DE APPR.   | LS       | CROSSTUBE (AS 350/355 HI AFT)  | NTS          |
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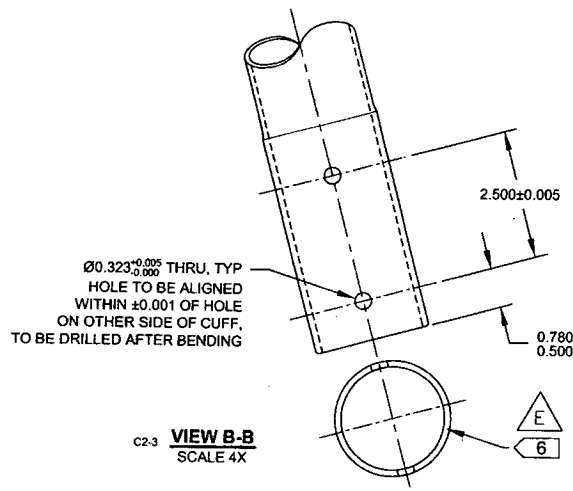
91178



**D350-748-241**  
**BENDING AND DRILLING DETAIL** 10

RELEASED  
2011-01-18

UNDER REVIEW  
12.9.18



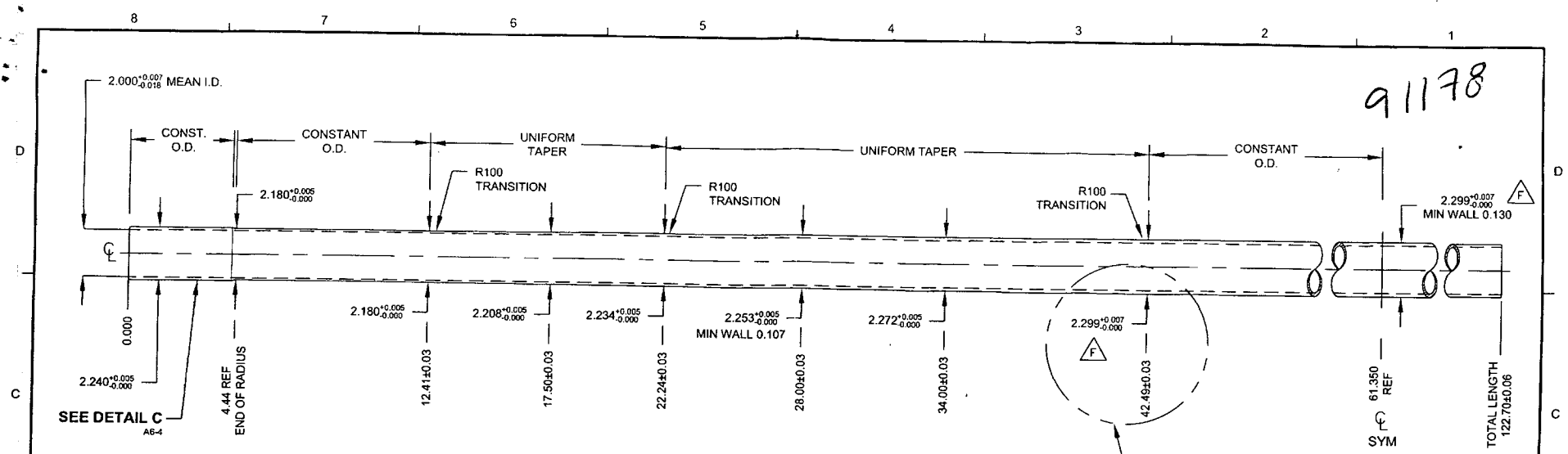
**VIEW B-B**  
**SCALE 4X**

|            |          |   |              |
|------------|----------|---|--------------|
| DESIGN     | 9P       | <b>DART AEROSPACE LTD</b>   |              |
| DRAWN      | 9P       | HAWKESBURY, ONTARIO, CANADA   |              |
| CHECKED    | 9P       | DRAWING NO.   | REV. F       |
| MFG. APPR. | 9P       | D350-748-241  | SHEET 3 OF 4 |
| APPROVED   | 9P       | TITLE   | SCALE        |
| DE APPR.   | 9P       | CROSSTUBE (AS 350/355 HI AFT)   | NTS          |
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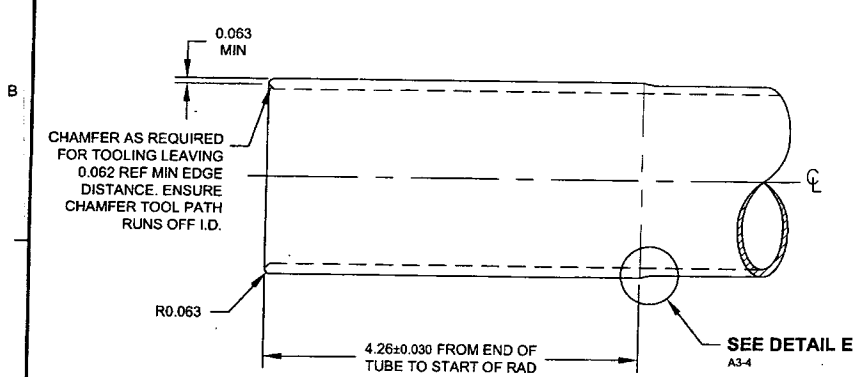
91178



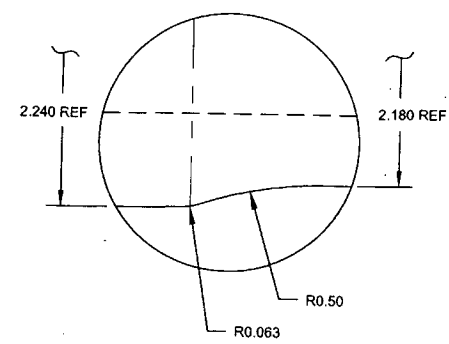
**D350-748-241TRN  
TURNING DETAIL**

UNDER REVIEW  
12/5/18

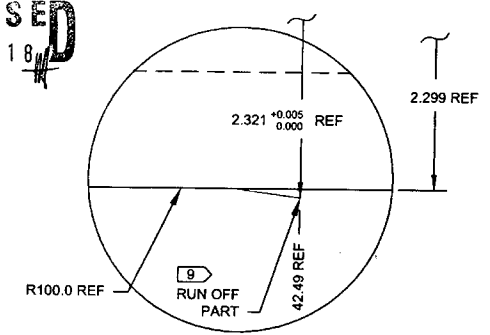
RELEASED  
2011-01-18



**DETAIL C:  
CROSSTUBE CUFF** C8-4  
SCALE 3X



**DETAIL E:  
CUFF TRANSITION** A5-4  
NOT TO SCALE



**DETAIL D:  
TAPER RUN-OFF** C3-4  
NOT TO SCALE

|            |          |  |              |
|------------|----------|--|--------------|
| DESIGN     | GP       | <b>DART AEROSPACE LTD.</b>   |              |
| DRAWN      | GP       | HAWKESBURY, ONTARIO, CANADA  |              |
| CHECKED    | JS       | DRAWING NO.  | REV. F       |
| MFG. APPR. | E        | D350-748-241   | SHEET 4 OF 4 |
| APPROVED   | TH       | TITLE  | SCALE        |
| DE APPR.   | TH       | CROSSTUBE (AS 350/355 HI AFT)  | NTS          |
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1000 E. Mermaid La., Wyndmoor (Phila.) PA 19038-8093  
Tel. (215) 233-2600 Fax (215) 233-5653

## Certification

### SOLD TO

Dart Aerospace Ltd.  
1270 Aberdeen Street  
Hawkesbury, ON K6A 1K7

December 19, 2012

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|                              |  |
|------------------------------|--|
| <b>Metlab Shop Order No:</b> | 74779  |
| <b>Purchase Order:</b>       | 18419  |
| <b>Description:</b>          | Cross Tube   |
| <b>Part No.:</b>             | D350-748-241/141   |
| <b>Quantity:</b>             | 15 Pieces  |
| <b>Weight:</b>               | 320 Pounds   |
| <b>Material:</b>             | 4130 Alloy Steel   |
| <b>Specifications:</b>       | Harden and temper to 180 KSI minimum ultimate tensile strength<br>(40-45 HRC surface hardness) |

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*5/13/01/03*

This is to certify that the above parts were processed as indicated above and conform to the specification requirements.


### Results:

Ultimate Tensile Strength: 181,000/194,000\*

Surface Hardness: 40/42 HRC

\*Converted from 40/42 HRC surface hardness

METLAB

  
Quality Representative Mark Jenkins

MERCURY CONTAMINATION: During the heat treating process, testing and inspections, the product did not come in direct contact with mercury or any of its compounds nor with any mercury containing device.



Heat Treating and Metallurgical Consulting

# D 350 X-TUBE CUFF MEASUREMENTS

## AFTER HEAT TREATING

|    | TYPE | BATCH # | SIDE A<br>TWO READINGS | SIDE B<br>TWO READINGS |
|----|------|---------|------------------------|------------------------|
| 1  | AFT  | B91179  | 2.256"/2.239"          | 2.260"/2.247"          |
| 2  | AFT  | B91183  | 2.240"/2.236"          | 2.246"/2.255"          |
| 3  | AFT  | B91180  | 2.250"/2.248"          | 2.240"/2.251"          |
| 4  | AFT  | B91181  | 2.248"/2.221"          | 2.264"/2.237"          |
| 5  | AFT  | B91178  | 2.286"/2.248"          | 2.250"/2.238"          |
| 6  | AFT  | B91182  | 2.249"/2.237"          | 2.265"/2.252"          |
| 7  | AFT  |         |                        |                        |
| 8  | AFT  |         |                        |                        |
| 9  | AFT  |         |                        |                        |
| 10 | AFT  |         |                        |                        |
|    |      |         |                        |                        |
| 1  | FWD  | B86267  | 2.237"/2.259"          | 2.276"/2.208"          |
| 2  | FWD  | B86269  | 2.274"/2.210"          | 2.247"/2.234"          |
| 3  | FWD  | B91176  | 2.266"/2.236"          | 2.278"/2.216"          |
| 4  | FWD  | B86268  | 2.255"/2.234"          | 2.260"/2.232"          |
| 5  | FWD  | B91175  | 2.257"/2.214"          | 2.258"/2.230"          |
| 6  | FWD  | B91171  | 2.260"/2.221"          | 2.257"/2.230"          |
| 7  | FWD  | B91173  | 2.258"/2.219"          | 2.244"/2.238"          |
| 8  | FWD  | B91174  | 2.268"/2.215"          | 2.265"/2.216"          |
| 9  | FWD  | B91172  | 2.261"/2.224"          | 2.262"/2.235"          |
| 10 | FWD  |         |                        |                        |
| 11 | FWD  |         |                        |                        |
| 12 | FWD  |         |                        |                        |